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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Anuj B. Gosalia

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EXAMINER

ARCOS, CAROLINE H

ART UNIT

PAPER NUMBER

2195

MAIL DATE

DELIVERY MODE

11/01/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/763,778	GOSALIA ET AL.	
	Examiner	Art Unit	
	Caroline Arcos	2195	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 15-22 is/are pending in the application.
- 4a) Of the above claim(s) 1-14 and 23-37 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 15-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01/22/2004 and 02/23/2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>01/22/2004 and 6/22/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-37 are pending in the application.

Election/Restrictions

2. Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Group I, claims 1-14, drawn to a method of scheduling process classified in class 718, subclass 102.
- II. Group II, claims 15-22, drawn to memory resource allocation, classified in class 718, subclass 104.
- III. Group III, claims 23-32, drawn to CPU interrupts, classified in class 710, subclass 260+
- IV. Group IV, claims 33-37, drawn to Graphic user interface, classified in class 715.

3. Inventions Group I, Group II, Group III and Group IV are related as subcombinations disclosed as usable together in a single combination. Group I is drawn to a method of scheduling process. Group II is drawn to memory resource allocation. Group III is drawn to CPU interrupt. Group IV is drawn to Graphic user interface. The subcombinations are distinct from each other if they are shown to be separately usable. In the instant case, inventions Group I, Group II, Group III and Group IV have separate utility such as search for Group I invention is not

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require for Group II, or Group III or group IV invention and vice versa. See MPEP § 806.05(d).

4. Because these inventions are distinct for the reasons given above and have required a separate status in the art shown by their different classification, restriction for examination purposes as indicated is proper.
5. Because these inventions are distinct for the reasons given above and the search required for one group is not required for the other groups, restriction for examination purposes as indicated is proper.
6. During a telephone conversation with Mr. ARI Gilder on 10/02/2007 a provisional election was made without traverse to prosecute the invention of group II, claims 15-22.
7. Applicant in replying to this Office action must make affirmation of this election. Claims 1-14 and 23-37 are withdrawn from further consideration by the examiner, 37 CFR 1.1142(b), as being drawn to a non-elected invention.

In addition, in response to this office action, applicant is required to cancel the non-elected claims.

8. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).
9. It is noted that although the present application does contain line numbers in the specification and claims, the line numbers in the claims do not correspond to the preferred format. The preferred format is to number each line of every claim, with each claim beginning with line 1. For ease of reference by both the Examiner and Applicant all future correspondence should include the recommended line numbering.

Claim Rejections - 35 USC § 112

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

11. Claims 15-22 are rejected under 35 U.S.C 112; second paragraph, as being Indefinite for failing to particularly point out and distinctly claim the subject matter Which, the applicant regards as the invention.

a. The claim language in the following claims is not clearly understood:

i. as per claim 15, line 2, it is unclear where the memory resources reside; it is not clearly understood whether they are in the coprocessor or different place.

Line 5, "proper location", it is unclear what is considered proper location, is it mapping to the same exact address or having enough space. For examination purpose, examiner interprets "proper location" as same exact address as physical memory.

Line 10, "processing said indicator", it is unclear how the processing is done, is it reading the information or what is considered processing in this case.

ii. as per claim 16, it is unclear what is GPU abbreviated from?

Appropriate corrections are required.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 15-18 and claim 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kogure (US 5,247,674), and in view of MacDonald et al. (MacDonald)(US 5,696,927).
14. As per claim 15, Kogure teaches the invention substantially as claimed including a method for streamlining operations in a coprocessor by indicating whether all required memory resources for a task are available prior to beginning the processing (execution) of the task (Col. 1, lines 38-41; Col. 3, lines 45-47), comprising:
- processing said indicator memory resource substantially at the beginning of processing the task (Column 3, lines 41-43).
15. Kogure did not teach preparing a task for processing in a coprocessor by paging memory resources associated with the task into coprocessor-readable memory;
- sampling the memory resources to determine if all required memory resources are in a proper location in the coprocessor-readable memory;
 - recording whether all required memory resources are in a proper location in the coprocessor-readable memory, wherein said recording generates an indicator memory resource that is associated with the task; and
 - if said indicator resource indicates that all required memory resources are not in a proper location in the coprocessor-readable memory, the coprocessor stops processing the task.

16. However, MacDonald teaches preparing a task for processing in a coprocessor by paging memory resources (address) associated with the task into coprocessor-readable memory (Col 3, lines 24-27);

sampling the memory resources to determine if all required memory resources(reference page table) are in a proper location(corresponding page directory entry) in the coprocessor-readable memory;

recording whether all required memory resources are in a proper location in the coprocessor-readable memory (Col.10, lines 13-19);

said recording generated an indicator memory resource that is associated with the task (Col. 10, lines 13-19), where page table availability in memory is an indicator as claimed; and

if said indicator resource indicates that all required memory resources are not in a proper location in the coprocessor-readable memory, the coprocessor stops (page fault) processing the task (Col. 9, lines 63-67; col. 10, lines 1-2).

17. It would be obvious to one of an ordinary skill in the art at the time the invention was made to have combined the teaching of Kogure and MacDonald because MacDonald 's teaching of paging memory resources would improve the efficiency of operation and better scheduling techniques for Kogure's system.

18. As per claim 16, Kogure and MacDonald did not teach that a coprocessor is a GPU. However, MacDonald teaches a processor that allocates memory resources

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in advance and determines if all required locations are in the proper place.

19. It would have been obvious to one of ordinary skill in the art to have included GPU in Kogure and MacDonald's system because GPU is known in the art to improve the manipulation and displaying of computer graphics.

20. As per claim 17, MacDonald teaches the task is represented by a DMA buffer (Col. 7, lines 5-7).

21. As per claim 18, MacDonald teaches that the coprocessor stops processing the task because processing said indicator memory resource generated a page fault (Col. 9, lines 63-67; col. 10, lines 1-2).

22. As per claim 22, MacDonald teaches the step of generating a page fault when a context switch occurs to a context that references an invalid ring buffer or an invalid DMA buffer (Col 10, lines 18-21; Figure 5).

23. Claims 19-21 rejected under 35 U.S.C. 103(a) as being unpatentable over Kogure (US 5,247,674), in view of MacDonald et al. (MacDonald)(US 5,696,927), and further in view of Miro (US 5,220,653).

24. As per claim 19, MacDonald Teaches that all required memory resources can be brought to a proper location in coprocessor-readable memory at a later time (Col. 10, lines 23-28). However, Kogure and MacDonald did not teach maintaining a list of tasks that the coprocessor stopped processing.

25. Miro teaches maintaining a list of tasks that the coprocessor stopped processing (Col. 11, lines 1-4; 96, Figure 10).

26. It would be obvious to one of an ordinary skill in the art at the time the invention was made to have combined the teaching of Kogure, MacDonald and Miro because Miro 's teaching of having a list of tasks that the coprocessor stopped processing will improve the efficiency of task scheduling and fairness by referring to the list for information.

27. As per claim 20, Miro teaches the later time is determined based on a priority of tasks on the list of tasks (Col 4, lines 1-3).

28. As per claim 21, Miro teaches a periodic priority boost that increases the priority of one or more tasks on the list of tasks to ensure that all tasks eventually can be processed (Abstract, lines 12-18).

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29. As per claim 22, MacDonald teaches generating a page fault when a context switch (Page fault handler) occurs to a context that refers an invalid ring buffer (TLB) or an invalid DMA buffer (Col 10, lines 18-28).

Conclusion

30. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Francesc et al. ("MemTo: a memory monitoring tool for Linux cluster, 2001, pages 225-232) teaches memory monitoring system for resource availability.

Terry (US 5864713 A) teaches a method for determining if data should be written at the beginning of a buffer depending on space available after unread data in the buffer.

David B. Kirk ("SMART (strategic memory allocation for real time) Cache design") teaches memory allocation for real time.

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31. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caroline Arcos whose telephone number is 571-270-3151. The examiner can normally be reached on Monday-Thursday 7:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai An can be reached on 571-272-3756. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

32. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Patent examiner

Caroline Arcos



MENG-AI AN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER